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# TMJ MRI IN CLINICALLY EQUIVOCAL CASES- INDICATIONS, FINDINGS AND FUTURE AHEAD

Radiodiagnosis

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## ABSTRACT

***Background*:** There is a need to assess Temporo Mandibular Joint (TMJ) arthralgia and other symptoms like locking and clicking by non invasive methods like Magnetic Resonance Imaging(MRI).

***Methods*:** 100 TMJs were assessed on 1.5 T plain MRI in closed and open mouth positions. Images were obtained in the oblique coronal and oblique sagittal orientation to delineate the articular disc in the entirety.

***Results*:** Many significant relationships were obtained between the clinical manifestations of the internal derangements of the TMJ and the MRI findings of disc abnormalities and mandibular condylar pathologies like hypoplasia. TMJ syndrome was seen to affect the relatively younger patients and is a source of morbidity in the economically productive age groups. There is significant relationship between the pain and disc displacement with reduction (DDR). Disc displacement with reduction on mouth opening (DDR) is much commoner than disc displacement with no reduction (DDNR). Mandibular hypoplasia and pain have near significant relationship ($p= 0.056$). Further studies with larger sample sizes than our study, is recommended to test the association between the two. TMJ with clicking has significant association with disc displacement with reduction (DDR). Mandibular hypoplasia has significant relationship with disc displacement with no reduction (DDNR). This association has not been reported by previous studies, according to our knowledge. Cases with mandibular hypoplasia are more likely to develop secondary degenerative changes. This association was found to be near significant ($p= 0.0525$). Further studies with larger sample sizes than our study, is recommended to test the association between the two.

***Conclusion*:** MRI in closed and open mouth position to assess the TMJ disc and adjacent relevant structures around the TMJ remains the gold standard for the evaluation of this joint and should be the standard of care before offering the treatment for the same.

## KEYWORDS

Temporomandibular Joint (TMJ) Disorders, Magnetic Resonance Imaging(MRI), Arthralgia, Mandible, Internal Derangement(ID)

## INTRODUCTION:

The Temporo Mandibular Joint (TMJ) has traditionally remained poorly understood joint with limited treatment offered in its various disorders [1, 2]. The communication between radiologists and the dental surgeons has paved way for better assessment of the joint and precise localization of the pathology in most of the cases. The impact of imaging techniques on the diagnosis of Temporo Mandibular Joint (TMJ) disorders is undeniable[3] Temporo Mandibular Disorders (TMD) syndrome demonstrates a complex pathophysiology, with a variable correlation of the patient's clinical signs and symptoms with the degree of anatomic derangement within the joint [4] The Magnetic Resonance Imaging(MRI) has accuracy of 95% and 93 % in assessing the position and configuration of the articular disc and the assessment of the osseous changes respectively.[5]

Conventional radiography and arthrography have little but limited role in the assessment of the TMJ disorders [6]. MRI is the modality of choice in imaging of the TMJ [4]. With the advent of MRI more and more disc abnormalities are being diagnosed, many times with different criteria for diagnosis of disc displacement [7]. Few disc abnormalities are present in clinically asymptomatic population whereas few of the symptomatic patients have normal findings on MRI. MRI of TMJ has emerged a prerequisite for treatment of TMJ pathologies like- surgical arthroscopy, modified mandibular splint etc [8,9].

## MATERIALAND METHODS:

After taking approval of the institutional ethical committee and prior consent of the patients, total of 50 consecutive patients (100 TMJs) were imaged on 1.5 T MRI machine in closed and open mouth positions. The study was designed as an observational case series. The inclusion criteria consisted of Orofacial pain referred to TMJ and the presence of TMJ pain during palpation, function and unassisted or assisted mandibular opening. Patients with history of acute trauma, nonspecific myalgia and with contraindication to MRI examination such as electronically, magnetically and mechanically activated implants ferromagnetic or electronically operated active devices were excluded from the study.

All patients included in the study were imaged on 1.5 T MRI (Siemens Magnetom Symphony) machine. MRI was carried out with a transmit-and-receive head coil, with the patient in a supine position. The following sequences were obtained: T1WI 3D (TR 11, TE 5.2, flip angle 15 degrees, matrix 224 x 256, slice thickness 1 mm, FOV 270 mm, avg. 1,concatenations 1)

T2WI TSE axial (TR 2260, TE 104,flip angle 150 degrees, matrix 312 x 312, slice thickness 3 mm, FOV 250 mm, avg. 3, concatenations 1) PD & T2WI coronal (TR 2160, TE 14 and 86, flip angle 150 degrees, , matrix 256 x 256, slice thickness 3 mm, FOV 230 mm, avg. 2, concatenations 1)

Sequential bilateral PD & T2WI sagittal images with the subject's mouth closed and at the maximum mouth opening positions ( TR 2900, TE 14 & 86 ,flip angle 150 degrees ,matrix 192 x 256,slice thickness 3 mm, FOV 160 mm , avg. 1, concatenations 1 )

Oblique sagittal images were taken along the mandibular condyles so that the articular discs were better visualized.

MRIs were analyzed for the disc-condyle relationship that depicted the disc, condyle, articular eminence and glenoid fossa. A normal disc position was defined as the posterior band of the disc being located at the superior, or 12 o'clock position relative to the condyle, whereas disc displacement was defined as the posterior band of the disc being in an anterior, anteromedial, anterolateral, medial or lateral position relative to the superior part of the condyle. If the disc relocated to its normal position on opening of the mouth, it was considered disc displacement with reduction, or DDR whereas when there was no relocation on opening of mouth to its normal position it was considered as disc displacement without reduction, or DDNR. The alternative protocol of abnormal disc position was not followed [7] The diagnosis of TMJ OA was based on the presence of flattening; subchondral sclerosis; surface irregularities, and erosion of the condyle or presence of condylar deformities associated with flattening [10,11,12]. In addition atrophy or hypertrophy of the lateral pterygoid muscle (LPM), retrodiscal hyper intensity & effusion were also assessed. The normal mandibular condyle was assumed between 15 to 20 mm when measured from left to right and 8 to 10 mm in anteroposterior dimension [13]. Concomitant use of other imaging modalities like CT, tomography, ultrasound was not done. Gadolinium enhanced and Post intervention imaging of TMJ was not done.

**RESULTS:**

A total of 100 TMJs were subjected to the study. The Female: Male ratio was 3:2. Overall age category suffering from TMDs was 31.10 ± 12.12 yrs.

Maximum numbers of patients were in the age group of 14-24 (18, 36 %).

The highest no of patients (32, 64 %) were having pain and clicking/noise both, followed by pain (13, 26 %).

As far as the symptomatic TMJs were concerned, 25 (50 %) of the patients had bilateral problems. The association between DDR and pain (Table 1) was found to be significant.

Near- significant association was found between the mandibular hypoplasia and pain on the ipsilateral side (Table 2).

The association between the Disc Displacement with Reduction (DDR) and clicking/noise was statistically significant [Table 3].

The association between mandibular hypoplasia and DDNR was significant [Table 4].

The association between OA changes and mandibular hypoplasia was near significant [Table 5].

Out of 100 TMJs studied, 29 of the joints were normal, but the patients had pain.17 % of TMJs had click, but no abnormality noted on MRI.

The patients with osteoarthritic changes were 11 % of total TMJs and the patients with hypoplastic mandibular condyles were 12 %.

The MRI findings in the study has been tabulated in Tables 6 and 7. Cases from our study have been shown in figures 1 to 3.

**DISCUSSION:**

During the early stage of the internal derangement (ID), there is clicking with early mouth opening or later with the closing phase, with no pain or limitation of the joint movement. This occurs typically when the anteriorly displaced articular disc reduces with mouth opening [14]. As the internal derangement persists, there is a progressive increase in symptoms, with limited motion, pain, tenderness, and joint crepitus.

Optimal MRI of the TMJ is performed by using the surface coil. It allows for a small field of view (FOV) and provides a high signal-to-noise ratio (SNR). A dual 3-inch surface coil is used for simultaneous imaging of both TMJs, significantly reducing the examination time. Proton density (PD) images show the articular disc and bony details better. Coronal PD-weighted images are obtained to evaluate the joint for a component of medial or lateral disc displacement.T2-weighted fast spin-echo (FSE) sagittal oblique images are used to assess for the joint effusion. For the open-mouth image of the both TMJs, the patient is asked to open his/her mouth till the maximal tolerance. Most rely upon sagittal images in the closed and open positions, though coronal images, motion studies and intravenous or intra- articular gadolinium studies have also been advocated [15]. If the patient assumes a partial open mouth position the condylar head moves slightly out of the glenoid fossa, allowing the disc to be separated from the bony surfaces so that it is more easily seen in its entirety [13]. In the partial open mouth position, the disc is often in the normal position, having reduced from an anteriorly displaced position. Hence many false negative studies could result if the partial open mouth images are relied on for diagnosing disc position. Proton density sequences are useful in evaluating disc morphology. Coronal images are useful to evaluate medial and lateral displacements of the articular disc [16]. In a physiologic joint, the posterior band of the disc lies within 10° of the 12 o'clock position [17, 18].

Disc displacement – The initial and most important point in the evaluation of the TMJs is the position of the intervening articular disc. As many as 80% of symptomatic patients may have the displacement of the articular disc [16] Coronal oblique images of the TMJs are used for the assessment of the mediolateral displacement of the disc. However this type of disc displacement is less common. In some cases, a "stuck disc" is identified, typically due to fibrous adhesions that prevent any kind of articular disc [19].

Joint effusion and marrow edema –The marrow signal abnormalities on the MRI images of the joint may reflect bone marrow edema, osteonecrosis, or may be related to osteoarthrosis. Sano et al.[20]reported that joints which had bone marrow signal alterations were more painful than the joints with no marrow signal abnormalities.

Osteoarthritis - The earliest osseous manifestation of degenerative change of the TMJ is presence of erosion of the mandibular condyle. [21] Formation of osteophytes, subchondral cysts, and low signal in the subchondral bone, compatible with sclerosis are more advanced degenerative changes in the joint. These pathologic changes develop when articular disc displacement is well established [22]. These changes can be seen in young patients with long standing internally deranged TMJs. Flattening and osteophytes are significantly correlated with TMJ dysfunction. The other two signs (sclerosis and erosions) could be more difficult to detect, and depend on the various MRI techniques applied [23].

Increased retrodiscal soft tissue T2WI signal in symptomatic joints, likely reflecting hyperemia and perivascular inflammation was described by Sano et al.[20] Our study did not demonstrate any significant association between the TMJ ID and changes in the retrodiscal tissues.

Posterior disc displacement-This rare pathologic entity has an overall incidence between 0.01 to 0.001 of TMJ disorders [24, 25]. There were no patients with posterior displacement of the articular disc in our study. This finding is consistent with most of the previous studies [26]. In the study, 30 (60 %) of patients were females and 20 (40 %) were males. None of the patients had any significant morbidity. The average age is lower in comparison to study by Tamir A Hassan et al [27].

Patient's most common presentation was the pain and click/noise in the involved joints (64 % of the cases). The problem was bilateral in half the number of patients. Taken separately, pain was the most common complaint (75 % of the TMJs). This matches with most of the studies [28,29,30,31]

Disc displacement with reduction (DDR) was the commonest finding noted in the patients presenting with TMJ pain. DDR (43 % of symptomatic TMJs) was commoner than DDNR (12 % of the cases). Similar results were found in studies by Samara et al.[30] kumar et al[31] and Tallents et al.[32] Joint effusion was present in only 17 % of the painful joints and had no significant relationship with pain. Similar results were found in previous study by Samara et al.[30] However the association was found to be significant by Takahara et al. [29] No statistically significant relationship was found between osteoarthritic changes and DDR or DDNR. Similar results were found by Samara et al[30] but contradicts the study by Suenaga et al [28]

Mandibular hypoplasia and pain had near significant ($p= 0.056$) relationship. This finding has not been noted in previous literature studying TMJ ID association with TMJ dysfunction.

Significant relationship ($p = 0.042$) was noted between mandibular hypoplasia and disc displacement with no reduction (DDNR). This association also, has not been reported in previous works, according to our knowledge.

Near significant ($p= 0.0525$) relationship was noted between mandibular hypoplasia and OA changes. This finding has not been reported by researchers earlier and needs more studies with larger sample size than our study, to test the association between the two.

There was significant correlation ($p= 0.045$) between the pain and disc displacement with reduction (DDR). This is similar to the study by Farina et al.[33] and contradicts the study by Samara et al.[30]

No significant relationship ($p = 0.377$) was found between the pain and disc displacement with no reduction (DDNR), as noted in previous studies by Samara et al.[30] and Farina et al.[33] However studies by Suenaga et al [28] and Takahara et al.[29] found significant relationship between TMJ arthralgia and the DDNR. A PseudoDisc (PD) sign has been described by Bristela et al [34] in approximately 50 percent of cases with DDNR on long term follow up. Significant correlation ($p= 0.046$) was found between clicking and DDR, similar to the studies by Samara et al.[30] and Farina et al.[33] No significant correlation was found between click and disc displacement with no reduction

(DDNR). This finding contradicts the studies by Samara et al.[30] and Farina et al.[33]

Female to male ratio was 2.4:1 in a study by Samara et al.[30] however this ratio was 1.5:1 in our study.

Pain with normal disc position was found in 59 % of the patients in study by Samara et al.[30] where as it was 61 % in our study. The side on which the disc was displaced but clinically painless, is 12 % in our study and it was 22 % in a study by Samara et al.[30] There was no significant difference in frequency of disc involvement of each side like the studies by Whyte et al.[35] and Samara et al.[30] It has been reported that DD can be seen in up to one-third of asymptomatic individuals (Kircos et al.[36]. Haley et al. [37]) demonstrated that 26% of displaced discs (DD) were at the side without pain, while this rate in our study was 12%. The study by Samara et al.[30] had this finding in 43 % of cases.

The results of the present study, demonstrate that DD was the most common finding in symptomatic patient and that it compares favorably with the results of other studies (Samara et al.[30], Kumar et al [31], Emshoff et al.[38] Tasaki et al.[16]).

MRI did not reveal any abnormality in 32% of our cases, as compared to 30 % of cases in a study done by Samara et al.[30]. This indicates that DD is not the main source of patients' symptoms. This finding is in accordance with previous studies. [30]

Some authors questioned whether anterior DD is a pathologic finding or just a normal variant (Lieberman et al.[39]) However, in our study, no control subjects had been examined, so we cannot consider the variation normal.

We did not find a statistically significant relationship between patient's pain and the presence of joint effusion and that was comparable to other reports (Samara et al.[30], Farina et al[33]., Adame et al.[40] ). Significant difference in joint exudate volume/fluid between patient group and control group was reported by Yang et al[41].

It has been reported also that if osteoarthritic changes occur in young individuals, a longstanding disc displacement without reduction should be ruled out (Helms et al.[42])

Our study supports the previous study [30] that the Temporoma ndibular disorders are most likely related to muscular and ligamentous dysfunction rather than derangements in the TMJ itself.

Disc condyle relationship can serve as an important indicator to judge anterior disc displacement and can be used to distinguish disc displacement with or without reduction [41]. Condylar morphology correlates with pronounced differences between OA and asymptomatic condyles [28].

Relationship between joint pain, muscle pain and brain activation have been studied and found to reasonably explain the causes of non discal TMJ causes of TMJ pain.[28] Many etiological factors explaining the increased incidence of TMD among woman of reproductive age group and relation of menstrual cycle and TMJ pain have been proposed[28]. The patients with normal MRI findings in spite of clinical symptoms of TMDs may be explained by Wang et al [43], who revealed that major classes of TMDs include internal derangement, osteo arthrosis, and myofascial syndromes, the first two of which can be seen with MRI. There is need to assess the TMJ disc, condyles and soft tissue structures along with joint fluid to explain the patient's symptoms and to go for MRI even after adequate clinical assessment [44, 45] and plan the management accordingly. An imaging reporting system like BIRADS for Breast, LIRADS for Liver etc. may be formulated(i.e. T-MRADS) after reaching a consensus between Oral and maxillofacial surgeons and Radiologists with special area of interest being Head and Neck region.

Arthrocentesis in DDNR has emerged as proven modality for treatment of TMJ pain, the diagnosis of which is supplemented and confirmed by MRI [46, 47, 48,49]. MRI has also been used for image guided intervention procedures [50].

## CONCLUSION:

Following conclusions can be drawn from the study:

1. MRI should be used as a supplement to clinical assessment and for planning treatment for patients with TMJ syndrome.
2. TMJ syndrome affects the relatively younger patients and is also a source of morbidity in the economically productive age groups.
3. There is significant relationship between the pain and disc displacement with reduction (DDR).
4. Disc displacement with reduction on mouth opening (DDR) is much commoner than disc displacement with no reduction (DDNR).
5. Mandibular hypoplasia and pain have near significant relationship (p= 0.056). Further studies with larger sample sizes than our study, is recommended to test the association between the two.
6. TMJ with clicking has significant association with disc displacement with reduction (DDR).
7. Mandibular hypoplasia has significant relationship with disc displacement with no reduction (DDNR). This association has not been reported by previous studies, according to our knowledge.
8. Cases with mandibular hypoplasia are more likely to develop secondary degenerative changes. This association was found to be near significant (p= 0.0525). Further studies with larger sample sizes than our study, is recommended to test the association between the two.
9. Development of T-MRADS incorporating all the findings on MRI(with additional methods like CT, Post contrast MRI, Delayed CE MRI, High resolution Ultrasound; decided on case to case basis) in a case of TMD should be mandatory and used in treatment of TMDs.

**MRI in TMJ disorders: proposed algorithm in a flowchart**

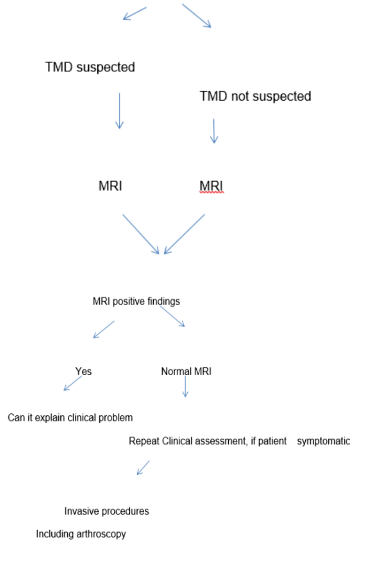



**TABLE-1: Association between DDR and Pain**
**Rows: DDR Columns: Pain-TMJ**

| | Both | Left | Right | None | All |
|---|---|---|---|---|---|
| Both | 100.00 | -- | -- | -- | 100.00 |
| | 14 | 0 | 0 | 0 | 14 |
| | 8.68 | 1.68 | 1.96 | 1.68 | 14.00 |
| Left | 57.14 | 14.29 | 14.29 | 14.29 | 100.00 |
| | 4 | 1 | 1 | 1 | 7 |
| | 4.34 | 0.84 | 0.98 | 0.84 | 7.00 |
| Right | 50.00 | -- | 37.50 | 12.50 | 100.00 |
| | 4 | 0 | 3 | 1 | 8 |
| | 4.96 | 0.96 | 1.12 | 0.96 | 8.00 |
| None | 42.86 | 23.81 | 14.29 | 19.05 | 100.00 |
| | 9 | 5 | 3 | 4 | 21 |
| | 13.02 | 2.52 | 2.94 | 2.52 | 21.00 |
| All | 62.00 | 12.00 | 14.00 | 12.00 | 100.00 |
| | 31 | 6 | 7 | 6 | 50 |
| | 31.00 | 6.00 | 7.00 | 6.00 | 50.00 |

**Chi-Square = 17.524, DF = 9, P-value = 0.045, No. of Common TMJ = 41**
**Cell Contents: % of Row, Count, Expected Frequency (All Cross Tables)**

**TABLE-2: Association between Mandibular Hypoplasia and Pain**
**Rows: Mandibular Hypoplasia Columns: Pain**

| | Both | Left | Right | None | All |
|---|---|---|---|---|---|
| Both | 50.00 | -- | -- | 50.00 | 100.00 |
| | 2 | 0 | 0 | 2 | 4 |
| | 2.48 | 0.48 | 0.56 | 0.48 | 4.00 |
| Left | 66.67 | -- | -- | 33.33 | 100.00 |
| | 2 | 0 | 0 | 1 | 3 |
| | 1.86 | 0.36 | 0.42 | 0.36 | 3.00 |
| Right | -- | -- | 100.00 | -- | 100.00 |
| | 0 | 0 | 1 | 0 | 1 |
| | 0.62 | 0.12 | 0.14 | 0.12 | 1.00 |
| None | 64.29 | 14.29 | 14.29 | 7.14 | 100.00 |
| | 27 | 6 | 6 | 3 | 42 |
| | 26.04 | 5.04 | 5.88 | 5.04 | 42.00 |
| All | 62.00 | 12.00 | 14.00 | 12.00 | 100.00 |
| | 31 | 6 | 7 | 6 | 50 |
| | 31.00 | 6.00 | 7.00 | 6.00 | 50.00 |

**Chi-Square = 15.064, DF = 9, P-value = 0.056, No. of Common TMJ = 7**

**TABLE-3: Tabulated Statistics: DDR, Clicking**
**Rows: DDR Columns: Clicking**

| | Both | Left | Right | None | All |
|---|---|---|---|---|---|
| Both | 28.57 | 50.00 | 21.43 | -- | 100.00 |
| | 4 | 7 | 3 | 0 | 14 |
| | 3.36 | 3.92 | 2.52 | 4.20 | 14.00 |
| Left | 42.86 | 14.29 | 14.29 | 28.57 | 100.00 |
| | 3 | 1 | 1 | 2 | 7 |
| | 1.68 | 1.96 | 1.26 | 2.10 | 7.00 |
| Right | 25.00 | 37.50 | 25.00 | 12.50 | 100.00 |
| | 2 | 3 | 2 | 1 | 8 |
| | 1.92 | 2.24 | 1.44 | 2.40 | 8.00 |
| None | 14.29 | 14.29 | 14.29 | 57.14 | 100.00 |
| | 3 | 3 | 3 | 12 | 21 |
| | 5.04 | 5.88 | 3.78 | 6.30 | 21.00 |
| All | 24.00 | 28.00 | 18.00 | 30.00 | 100.00 |
| | 12 | 14 | 9 | 15 | 50 |
| | 12.00 | 14.00 | 9.00 | 15.00 | 50.00 |

**Chi-Square = 17.249, DF = 9, P-Value = 0.046, No. of Common TMJ = 30**

**TABLE-4: Association between Mandibular Hypoplasia (Mand Hyp) and DDNR**
**Rows: Mand Hyp Columns: DDNR**

| | Both | Left | Right | None | All |
|---|---|---|---|---|---|
| Both | -- | 25.00 | -- | 75.00 | 100.00 |
| | 0 | 1 | 0 | 3 | 4 |
| | 0.16 | 0.48 | 0.16 | 3.20 | 4.00 |
| Left | 33.33 | 66.67 | -- | -- | 100.00 |
| | 1 | 2 | 0 | 0 | 3 |
| | 0.12 | 0.36 | 0.12 | 2.40 | 3.00 |
| Right | -- | -- | -- | 100.00 | 100.00 |
| | 0 | 0 | 0 | 1 | 1 |
| | 0.04 | 0.12 | 0.04 | 0.80 | 1.00 |
| None | 2.38 | 7.14 | 4.76 | 85.71 | 100.00 |
| | 1 | 3 | 2 | 36 | 42 |
| | 1.68 | 5.04 | 1.68 | 33.60 | 42.00 |
| All | 4.00 | 12.00 | 4.00 | 80.00 | 100.00 |
| | 2 | 6 | 2 | 40 | 50 |
| | 2.00 | 6.00 | 2.00 | 40.00 | 50.00 |

**Chi-Square = 18.924, DF = 9, P-Value = 0.042**

**TABLE-5: Association between OA Changes and Mandibular Hypoplasia**
**Rows: OA Change Columns: Mandibular Hypoplasia**

| | Both | Left | Right | None | All |
|---|---|---|---|---|---|
| Both | 0 | 0 | 0 | 3 | 3 |
| | -- | -- | -- | 100.00 | 100.00 |
| | 0 | 0 | 0 | 3 | 3 |
| | 0.24 | 0.18 | 0.06 | 2.52 | 3.00 |
| Left | 0 | 2 | 0 | 2 | 4 |
| | -- | 50.00 | -- | 50.00 | 100.00 |
| | 0 | 2 | 0 | 2 | 4 |
| | 0.32 | 0.24 | 0.08 | 3.36 | 4.00 |
| Right | 0 | 0 | 0 | 1 | 1 |
| | -- | -- | -- | 100.00 | 100.00 |
| | 0 | 0 | 0 | 1 | 1 |
| | 0.08 | 0.06 | 0.02 | 0.84 | 1.00 |
| None | 4 | 1 | 1 | 36 | 42 |
| | 9.52 | 2.38 | 2.38 | 85.71 | 100.00 |
| | 4 | 1 | 1 | 36 | 42 |
| | 3.36 | 2.52 | 0.84 | 35.28 | 42.00 |
| All | 4 | 3 | 1 | 42 | 50 |
| | 8.00 | 6.00 | 2.00 | 84.00 | 100.00 |
| | 4 | 3 | 1 | 42 | 50 |
| | 4.00 | 3.00 | 1.00 | 42.00 | 50.00 |

**Chi-Square = 15.703, DF = 9, P-Value = 0.0525**

**TABLE- 6: Tally for Discrete Variables: Clinical Assmt., Involved TMJ**

| Clinical Assmt | Count | % | Involved TMJ | # Pts./% | # TMJ/% |
|---|---|---|---|---|---|
| Clicking | 4 | 8.00 | Both | 25/50 | 50/50 |
| Pain | 13 | 26.00 | Left | 8/16 | 8/ 8 |
| Pain & Clicking | 32 | 64.00 | Right | 10/20 | 10/10 |
| None | 1 | 2.00 | None | 7/14 | 32/32 |

**# : Number; Pts: Patients**

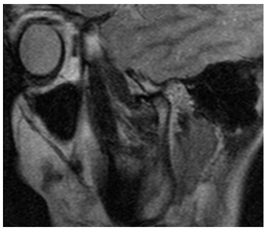
**TABLE 7: RELATIONSHIP BETWEEN CLINICAL PRESENTATION AND MRI FINDING (Total 100 TMJs)**

| MRI FINDING | CLINICAL PRESENTATION | |
|---|---|---|
| | PAIN | CLICKING |
| | No. Of TMJ/% (P-Value) | No. Of TMJ/% (P-Value) |
| Normal TMJ | 29/29 | 17/17 |
| DDR | 41/41(0.045) | 30/30 (0.046) |
| DDNR | 10/10(0.377) | 7/7 (0.677) |
| Joint Effusion | 16/16(0.157) | 11/11 (0.457) |
| LPM Normal | 74/74(0.958) | 47/47 (0.991) |
| LPM Atrophy | 2/2(0.958) | 1/1 (0.991) |
| JM Normal | 55/55(0.551) | 34/34(0.652) |
| JM Reduced | 16/16(0.548) | 11.11 (0.602) |
| JM Hyper | 6/6(0.978) | 5/5 (0.411) |
| OA Changes | 10/10(0.498) | 11/11 (0.075) |
| Mandibular Hypoplasia | 7/7(0.056) | 9/9 (0.261) |

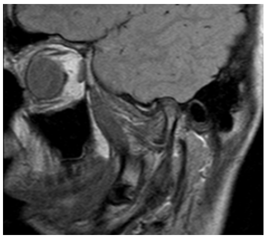
**Figure 1.** 14 Y/M Pain & clicking bilaterally

**T2WI SAG CLOSED MOUTH RT**

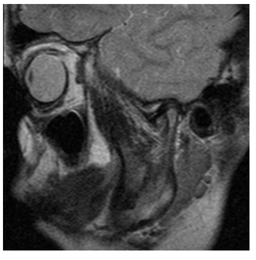
**T2WI SAG OPEN MOUTH RT**



**T2WI SAG CLOSED MOUTH LT**

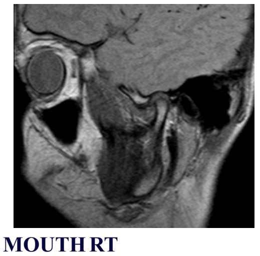


**PD SAG CLOSED MOUTH LT**

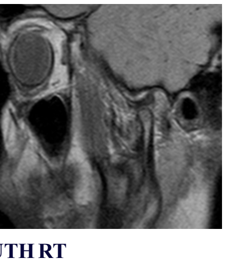


**T2WI SAG OPEN MOUTH LT**

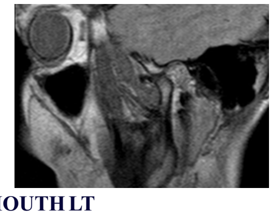
**T2WI AXIAL**



**PD SAG CLOSED MOUTH RT**



**PD SAG OPEN MOUTH RT**



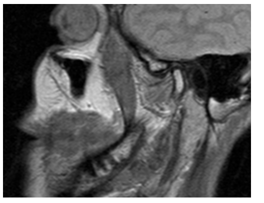
**PD SAG OPEN MOUTH LT**

MRI Findings:

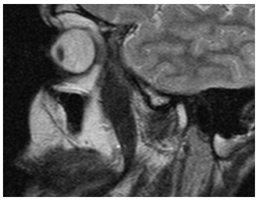
- Bilateral hypoplastic Mandibular condyles.
- Internal derangement of the both TM Joints with anterior displacement of the articular discs, with reduction on the right side and non-reduction on the left.

**Figure 2:**

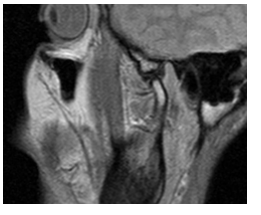
38/F Pain & clicking bilaterally



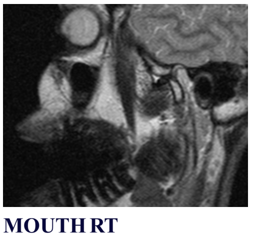
**PD SAG CLOSED MOUTH RT**



**T2WI SAG CLOSED MOUTH LT**



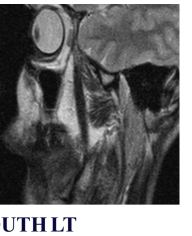
**PD SAG OPEN MOUTH LT**



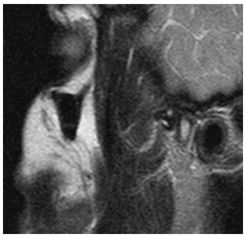
**T2WI SAG OPEN MOUTH RT**

**PD SAG CLOSED MOUTH LT**

**PD SAG OPEN MOUTH RT**



**T2WI SAG OPEN MOUTH LT**



**T2WI SAG CLOSED MOUTH RT**

MRI Findings:

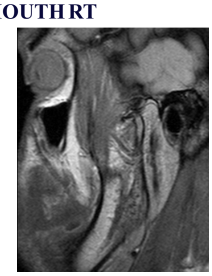
- Right TM joint articular disc displacement without reduction and joint effusion.
- Left TM joint articular disc displacement with reduction.

**Figure 3:** 21/M Pain & clicking bilaterally

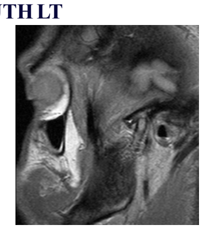
**PD SAG CLOSED MOUTH RT**

**T2WI SAG CLOSED MOUTH LT**

**T2WI SAG OPEN MOUTH RT**



**PD SAG OPEN MOUTH LT**



**PD SAG CLOSED MOUTH LT**

**T2WI SAG OPEN MOUTH LT**

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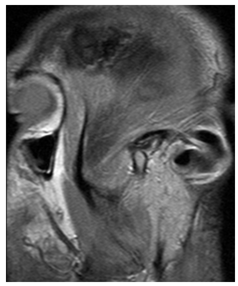

**PD SAG OPEN MOUTH RT**

MRI Findings:

- Left hypoplastic mandibular condyle, with secondary OA changes.
- Bilateral anterior displacement of the discs, with reduction on the right and non-reduction on the left side.
- Thinned out left articular disc and joint effusion/fluid bilaterally.

**Conflicts of interest**:
The authors have none to declare.

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None

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